M E M O R A N D U M

To: Board of Regents

From: Board Office

Subject: Annual Report on Energy Conservation

Date: August 30, 2001

Recommended Actions:

1. Receive the Annual Report on Energy Conservation.

2. Encourage the institutions to continue to pursue energy conservation measures and other methods to control energy costs in addition to the measures currently in place for FY 2002.

Executive Summary:

Annually, the Board receives a report on energy conservation efforts at the Regent institutions; this report provides a means of assessing the efficiency and effectiveness of the operations of the Regent institutions, consistent with Action Step 4.2.1.2. of the Board's Strategic Plan. This year's report will also:

- Provide information on energy usage and energy costs for FY 2001;

- Address the institutions' plans to control energy costs in FY 2002 and future years; and

- Provide a status report on the implementation of energy conservation measures.

The Regent institutions have significantly reduced their energy consumption on a BTU (British Thermal Unit) per gross square foot basis since FY 1979, the peak consumption year:

	BTU/GSF Change FY 1979 – FY 2001
University of Iowa	(21.1 percent)
Iowa State University	(34.0 percent)
University of Northern Iowa	(14.0 percent)

The reductions since 1979 are more impressive than the data indicate considering the growth in the installation of energy-consuming research and diagnostic equipment, personal computers and air conditioning equipment.

In FY 2001, total energy expenditures at the Regent institutions increased by 13.9 percent over FY 2000. While a portion of the total cost increases can be attributed to the heating and cooling of newly constructed or remodeled space, institutional increases in natural gas prices (based on $/Million BTUs) ranged from 46 percent to 157 percent. The universities also experienced increases in the cost of electricity (based on $/Kwh), and Iowa State University and the University of Northern Iowa experienced higher coal costs ($/Million BTUs).

The Regent institutions are in the process of identifying and implementing additional energy conservation measures to reduce/control FY 2002 energy expenditures. The institutional efforts will focus primarily on improvements in temperature settings and lighting levels, equipment use, classroom scheduling, and campus communications to ensure cooperation with the energy conservation plans.

Since 1989, the institutions completed a total of 692 energy conservation measures identified in comprehensive engineering analyses. Approximately $26 million have been spent on identified energy conservation measures to date, saving approximately $6.1 million annually for a simple payback of 4.3 years.

Background and Analysis:

The Board is required, in accordance with Iowa Code §473.12, to report by October 1 of each year to the Department of Natural Resources on the results of energy usage analyses of the Board's facilities and the status of energy conservation measures identified in the comprehensive engineering analyses completed by the institutions in 1989. Recent events suggest that energy conservation continues to be a critical budgetary issue. Data included in the report provide a means for assessing the efficiency of the operations of the Regent institutions.

The report provides a summary of current and historical energy usage and costs, information on institutional plans to control further FY 2002 energy expenditures, and a status report on the implementation of energy conservation measures. Additional detail is available in the institutional reports in the Regent Exhibit Book.

Energy Usage

Energy Consumption (BTUs/GSF)

	FY 1979	FY 1998	FY 1999	FY 2000	FY 2001	% Change FY 79 to FY 01	% Change FY 00 to FY 01
SUI	523,030	432,386	439,154	410,786	412,901	(21.1)	0.51
ISU	635,606	396,950	413,126	419,604	419,521	(34.0)	(0.02)
UNI	409,364	334,220	342,379	340,194	351,932	(14.0)	3.50
ISD	N/A	139,600	131,450	155,631	141,354	N/A	(9.20)
IBSSS	N/A	125,605	119,508	110,992	122,879	N/A	10.71

As noted above, FY 2001 energy consumption per gross square foot at the three universities remained relatively unchanged from FY 2000. Due partly to energy conservation measures already in place, the universities were able to maintain consumption at a relatively stable level during an extreme winter season.

Energy usage at the special schools is more dependent upon weather conditions as a smaller percentage of total campus space has sophisticated heating, ventilating and air conditioning and environmental control systems (energy "hogging" equipment). While the Iowa Braille and Sight Saving School experienced a 10.7 percent increase in consumption per gross square foot, the School reports that its ongoing energy conservation practices, such as the use of temperature control systems, prevented greater increases in consumption.

The Iowa School for the Deaf reports that its decrease in energy consumption per gross square foot (9.2 percent) resulted from the implementation of major energy conservation measures, including the installation of new, high efficiency boilers and replacement of portions of the steam distribution system.

Information detailing energy consumption by fuel source at the institutions is included in Appendix A.

Energy Costs

The following table summarizes institutional reports of total energy costs from FY 1995 through FY 2001. It does not include water, sewer or personnel costs.

Total Energy Costs

	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	% Change FY 2000-FY 2001
SUI	$13,007,388	$13,880,224	$12,712,118	$13,248,367	$13,272,715	$13,798,666	$16,071,459	16.5%
ISU	6,668,818	6,923,392	7,056,472	7,195,315	7,516,343	7,562,904	8,053,811	6.5%
UNI	2,166,114	2,504,404	2,460,272	2,279,672	2,263,235	2,309,343	2,731,833	18.3%
ISD	134,730	154,531	190,727	172,155	166,353	168,151	267,431	59.0%
IBSSS	119,852	111,797	122,645	98,245	87,080	90,221	136,828	51.7%
TOTAL	$22,096,902	$23,574,348	$22,542,234	$22,993,754	$23,305,726	$23,929,285	$27,261,362	13.9%

Energy costs at the Regent institutions remained relatively stable from FY 1995 through FY 2000 even though the total gross square footage of campus facilities steadily increased during the period. However, FY 2001 energy costs increased 13.9 percent over the previous fiscal year. The cost increases can be attributed primarily to significant increases in the unit cost of natural gas, as the price of other fuels increased at a lesser rate and energy consumption remained relatively constant from FY 2000.

The increases in natural gas costs had a more dramatic impact at the special schools since they do not burn coal as do the universities. At the Iowa School for the Deaf, total energy costs rose 59 percent despite the School's 9.2 percent decrease in total energy consumption. At the Iowa Braille and Sight Saving School, the increases in both energy consumption and natural gas prices caused total energy costs to increase by 51.7 percent.

Energy costs per gross square feet are a function of usage (BTUs/GSF) and the cost of energy ($/MILLION BTUs). There are wide differences among the institutions in the cost of energy; changes in energy costs by institution by year represent fluctuations in the mix of fuels, fluctuations in coal, natural gas and purchased electricity prices and the availability of economy power.

The institutions' FY 2001 cost increases per gross square foot and per MMBTU are consistent with the increases in the institutions' total energy costs, with the smallest increases at Iowa State University and the largest increases at the special schools.

Total Energy Costs ($/GSF)

	FY 1999	FY 2000	FY 2001	% Change FY 1999 – FY 2001	% Change FY 2000 – FY 2001
SUI	$1.01	$1.01	$1.15	13.9	13.9
ISU	.75	.75	.79	5.3	5.3
UNI	.62	.62	.72	16.1	16.1
ISD	.55	.55	.86	56.4	56.4
IBSSS	.46	.47	.72	56.5	53.2

Total Energy Costs ($/Million BTUs)

	FY 1999	FY 2000	FY 2001	% Change FY 1999 – FY 2001	% Change FY 2000 – FY 2001
SUI	$2.29	$2.46	$2.78	21.4	13.0
ISU	1.81	1.79	1.87	3.3	4.5
UNI	1.80	1.81	2.05	13.9	13.3
ISD	4.08	3.51	6.10	49.5	73.8
IBSSS	3.86	4.27	5.85	51.6	37.0

Information detailing energy costs by fuel source at the institutions is included in Appendix A.

FY 2002 and Future Costs

Without further energy conservation measures (including operational and maintenance procedures), FY 2002 total energy costs are likely to increase. In addition to the increased cost of natural gas, the universities' FY 2002 coal contract prices per ton will increase by at least 25 percent from FY 2001 prices. The increase in coal prices can be attributed primarily to increases in natural gas and petroleum costs, and the resultant effect on the coal market.

The June 2001 special session of the Iowa General Assembly passed legislation to attract the development of electric power generating and transmission facilities to the state of Iowa in an effort to ensure reliable electric service to Iowa consumers and provide economic benefits to the state. While the legislation will

help to ensure an adequate electrical power supply for the state, it is unclear how the construction of new power plants may impact the cost and availability of electricity for all consumers. While an increased electrical supply may help to lower prices, the capital investment in the power plants may also contribute to cost increases. In addition, while the amount of available electricity may increase, the existing electrical transmission line capacity may continue to limit the distribution of the electrical power.

Efforts to Control Energy Expenditures in FY 2002

The institutions have developed plans to implement additional energy conservation measures in FY 2002 in an effort to control costs.

University of Iowa

The University has developed its "Principles for Energy Conservation" which will be implemented to guide University behavior in the area of energy conservation. The specific intent of the plan is to offset the rising prices of natural gas and coal. The following is a summary of the University's Principles:

- The University's energy conservation practices will be guided by its 2001-2005 strategic plan to respond to reductions in state appropriations, the availability and cost of energy resources, and the University's responsibility for environmental stewardship.

- The energy conservation initiatives and practices must not impede the University's ability to attract and retain students nor the teaching and research mission of the University.

- Classrooms will be scheduled to make efficient use of energy.

- Energy conservation measures must provide tolerable environmental conditions for faculty, staff and students; where possible, building temperatures will be set to 78 degrees in the summer and 68 degrees in the winter during operating hours, and set back further during off-hours and weekends.

- Energy conservation may also be achieved by considering alternative work arrangements such as flexible work hours, off-site assignments or telecommuting.

- The University will provide communications to promote and implement energy conservation initiatives and awareness among faculty, staff and students of all University units, and the local community.

- The University will continue its ongoing energy conservation initiatives and practices to provide sustainable cost savings in both the short- and long term.

- The University will explore the use of alternative and renewable energy resources.

The University reports that estimates of actual savings associated with these Principles would be developed as specific energy conservation measures are identified. The University further reports that it will review possible adjustments to building lighting levels and temperature settings to produce energy savings, and work with individual units to establish appropriate guidelines, with sensitivity to program needs.

Iowa State University

The University is implementing a comprehensive plan to provide general fund energy savings totaling $1.5 million in FY 2002; this would represent a 9 percent reduction in total energy expenditures. The University is auditing each campus building to evaluate potential energy saving strategies and building system performance, and to install energy control devices. The building audits will also identify other potential energy conservation measures for future implementation, contingent upon the availability of funding.

Additional efforts underway to produce energy savings include:

- Reducing energy use by powering down unnecessary or redundant equipment such as fume hoods, growth chambers, and office equipment;

- Turning off office equipment and lighting on the nights and weekends;

- Operating most campus buildings at 78 degrees in the cooling months (April through September) and 68 degrees in the heating months (October through March);

- Continuing the operation of the off-hour activity center program which clusters night classes and meetings into designated night activity areas;

- Shutting down as many building air handling systems as possible during the evenings and weekends; and

- Continuing to review new building and renovation projects for energy conservation opportunities.

University of Northern Iowa

The University is developing a plan to implement additional energy cost reductions; the plan would focus on modifications to building temperature settings. In addition, the University plans to distribute general campus communications requesting cooperation in reducing the use of lights, computers and other equipment. The University would also continue its unoccupied energy cycle programs during evenings, weekends and holidays.

Special Schools

The Iowa School for the Deaf reports that it will continue its efforts to reduce purchased utilities without restricting academic programming. Energy saving projects include the installation of additional insulation and exterior door and window replacements, and improved operating and maintenance procedures.

The Iowa Braille and Sight Saving School reports that it will work to identify additional energy conservation measures. These measures could include the use of more energy efficient lighting, evaluation of operating and maintenance procedures, and improved utilization of the energy management system.

Energy Conservation Measures

In accordance with Iowa Code §473.12, the institutions undertook analyses in 1989 to identify energy conservation measures in an effort to reduce energy consumption and control energy costs.

The analyses identified a total of $76.8 million (2001 dollars) in energy conservation measures, which were to be implemented if economically feasible and practical, and if they had a simple payback period of six years or less.

- The simple payback formula (total project cost divided by estimated annual savings) was used in all 1989 analyses to determine the estimated amount of time needed to realize energy savings equal to the project cost.

- The simple payback for the identified projects ranged from less than one month to more than 25 years.

Projects totaling $42.6 million had individual payback periods of six years or less and were identified as the projects most likely to be implemented. It was estimated that these projects would save approximately $10.6 million (2001 dollars) annually for a simple payback of 4.03 years.

Many of the projects identified in the technical assistance studies have not been completed because the payback period is greater than six years, the project was not feasible when further analyzed, or it was determined that installation costs were excessive due to unusual construction circumstances.

To date, approximately $26 million have been spent on 692 completed energy conservation measures (73 percent of the identified energy conservation measures with payback periods of six years or less), saving approximately $6.1 million annually for a simple payback of 4.3 years.

The majority of the energy conservation measures implemented at the institutions were completed a number of years ago; the institutions report that they will work to address the remaining measures to the extent that funding is available.

The costs and savings associated with the identified energy conservation projects are measured in 2001 dollars and are summarized by institution in Table 1 of this report (page 11).

In addition to the projects identified in the 1989 analyses, the institutions undertake other energy conservation projects and incorporate energy conservation measures into new construction and remodeling projects. In light of increasing energy costs, the institutions should continue these efforts, including conservation measures in the residence system facilities, if they are cost effective and feasible.

The University of Iowa is continuing with the MidAmerican Energy Efficient Commercial New Construction Program, which recommends various energy conservation strategies for new construction and major remodeling projects. The University reports that this program will result (when construction is complete) in construction incentives to the University totaling approximately $834,000 for six major new construction and renovation projects, including the renovations of the

Biology Buildings and the Hydraulics Laboratory, which are currently under construction. Projects under design for which incentives will be offered include:

Medical Education and Biomedical Research Facility—Building B
Hawkeye Athletic/Recreation Facility
Honors Building

Further institutional details on the institutions' energy conservation measures are included in Appendix B.

Sheila Lodge

Approved: Robert J. Barak

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TABLE 1
SUMMARY
ENERGY CONSERVATION MEASURES - IDENTIFIED AND COMPLETED

	Projects Identified in 1989 Engineering Analyses				Identified Projects with Payback Periods of Less than 6 Years				Identified Projects Completed to Date			
	# of Proj.	Identified Capital Costs (2001$)	Projected Annual Energy Savings (2001$)	Est. Pay-back Prd. (Yrs)	# of Proj.	Identified Capital Costs (2001$) 0	Projected Annual Energy Savings (2001$)	Est. Pay-back Prd. (Yrs)	# of Proj.	Actual Capital Costs (2001$)	Annual Energy Savings (2001$)	Est. Pay-back Prd. (Yrs)
University of Iowa												
General Fund - Main Campus	659	$16,154,852	$3,034,565	5.32	453	$7,509,909	$1,911,387	3.93	397	$9,695,776	$1,876,539	5.17
General Fund - Oakdale	67	418,832	72,128	5.81	45	138,141	34,330	4.02	29	292,468	51,661	5.66
Athletics	14	144,882	28,699	5.05	10	92,845	22,105	4.20	10	104,024	21,078	4.94
Hospital	17	15,139,812	3,156,646	4.80	12	11,297,786	2,802,864	4.03	12	7,320,553	1,805,780	4.05
Hospital School	7	659,254	131,706	5.01	4	533,810	120,863	4.42	4	542,301	115,513	4.69
Iowa Memorial Union	11	287,276	55,567	5.17	8	200,151	44,706	4.48	5	81,527	14,081	5.79
Residence Halls	100	1,259,132	271,349	4.64	62	770,073	209,672	3.67	28	386,538	96,379	4.01
Utility Enterprise	9	19,894,406	4,128,693	4.82	8	18,871,206	3,974,816	4.75	2	5,890,125	1,464,148	4.02
Subtotal	**884**	**$53,958,447**	**$10,879,353**	**4.96**	**602**	**$39,413,920**	**$9,120,744**	**4.32**	**487**	**$24,313,312**	**$5,445,179**	**4.47**
Iowa State University												
General Fund Buildings	507	$11,249,055	$1,111,478	10.12	180	$966,267	$664,454	1.45	108	$438,056	$213,181	2.05
Subtotal	**507**	**$11,249,055**	**$1,111,478**	**10.12**	**180**	**$966,267**	**$664,454**	**1.45**	**108**	**$438,056**	**$213,181**	**2.05**
University of Northern Iowa												
General Fund Buildings	228	$10,214,609	$1,437,593	7.11	63	$1,319,891	$537,268	2.46	49	$600,631	$331,389	1.81
Residence Halls	90	1,079,320	244,574	4.41	80	790,483	228,670	3.46	25	524,931	41,684	12.59
Subtotal	**318**	**$11,293,929**	**$1,682,166**	**6.71**	**143**	**$2,110,374**	**$765,938**	**2.76**	**74**	**$1,125,562**	**$373,073**	**3.02**
Iowa School for the Deaf	**16**	**$144,833**	**$27,628**	**5.24**	**11**	**$56,956**	**$17,313**	**3.29**	**11**	**$63,853**	**$11,410**	**5.60**
Iowa Braille & Sight Saving	**21**	**$108,706**	**$21,363**	**5.09**	**11**	**$57,985**	**$16,759**	**3.46**	**12**	**$68,096**	**$17,479**	**3.90**
TOTAL	**1,746**	**$76,754,970**	**$13,721,990**	**5.59**	**947**	**$42,605,501**	**$10,585,208**	**4.03**	**692**	**$26,008,878**	**$6,060,322**	**4.29**

Appendix A

Energy Consumption and Cost Data

Natural Gas Consumption

Natural Gas Consumption (Million BTUs)

	FY 1998	FY 1999	FY 2000	FY 2001	% Change FY 99 to FY 01	% Change FY 00 to FY 01
SUI	4,199,017	6,254,314	5,103,942	4,513,081	(53.5)	(11.6)
ISU	1,292,680	1,126,130	1,364,360	2,949,000	161.9	116.1
UNI	348,230	489,200	429,550	526,610	7.6	22.6
ISD	27,889	25,310	32,045	26,754	5.7	(16.5)
IBSSS	12,348	11,275	9,995	12,370	9.7	23.8

Changes in natural gas consumption were due to extreme winter weather conditions and the opening of new facilities.

The increase at Iowa State University is partially attributable to the opening of the first phase of the Hawthorn Court apartments. The University expects its natural gas consumption to continue to increase as the second phase of the Hawthorn Court apartments becomes operational in FY 2002.

The University of Iowa reduced its use of natural gas by 11.6 percent by increasing the consumption of coal, which provides a more cost-effective energy alternative.

The Iowa School for the Deaf attributes its decreased consumption to the implementation of a number of energy conservation measures including the installation of new, high efficiency boilers in the power plant, the replacement of portions of the steam distribution system and the installation of new insulation in the utility tunnels, and ongoing improvements in operating and maintenance procedures.

Electrical Consumption

Electrical Consumption (Million BTUs)

	FY 1998	FY 1999	FY 2000	FY 2001	% Change FY 99 to FY 01	% Change FY 00 to FY 01
SUI	2,592,486	2,659,040	2,570,657	2,370,970	(10.8)	(7.8)
ISU	845,060	822,196	792,582	736,438	(10.4)	(7.1)
UNI	401,647	431,823	429,298	433,885	0.5	1.1
ISD	15,385	15,439	16,201	17,066	10.5	5.3
IBSSS	11,195	11,256	11,132	10,659	(5.3)	(4.2)

The institutions' electrical consumption in FY 2001 decreased or remained relatively stable when compared to FY 2000. Purchased electricity decisions affect the total BTUs reported by the universities; the universities buy power when economically feasible and cogenerate when that is the most cost-effective option.

Coal Consumption

Coal Consumption (Tons)

	FY 1998	FY 1999	FY 2000	FY 2001	% Change FY 99 to FY 01	% Change FY 00 to FY 01
SUI	108,094	100,906	99,361	120,426	19.3	21.2
ISU	129,577	133,059	136,963	142,591	7.2	4.1
UNI	26,939	26,754	26,912	29,164	9.0	8.4

Coal consumption at the three universities increased in FY 2001 due to weather conditions as well as it being a more cost-effective alternative to higher natural gas costs.

Natural Gas Costs

Natural Gas Costs ($/Million BTUs)

	FY 1999	FY 2000	FY 2001	% Change FY 1999 – FY 2001	% Change FY 2000 – FY 2001
SUI	2.60	3.35	7.18	176.2	114.3
ISU	3.61	4.27	8.45	134.1	97.9
UNI	2.19	3.89	5.67	158.9	45.8
ISD	3.20	2.59	6.65	107.8	156.8
IBSSS	2.81	3.51	6.70	138.4	90.9

Consistent with national trends, the institutions' FY 2001 natural gas costs increased significantly over FY 2000. The Iowa School for the Deaf reports that its FY 2001 unit cost (156.8 percent higher than FY 2000) reflects a negotiated rate structure with the local utility. Without this negotiated rate, the School reports that its natural gas costs would have increased by more than 200 percent.

Electrical Costs

Electrical Costs ($/Kwh)[1]

	FY 1999	FY 2000	FY 2001	% Change FY 1999 – FY 2001	% Change FY 2000 – FY 2001
SUI	0.033	0.036	0.040	21.2	11.1
ISU[2]	0.026	0.027	0.034	30.8	25.9
UNI	0.026	0.027	0.029	11.5	7.4
ISD	0.064	0.062	0.061	(4.7)	(1.6)
IBSSS	0.056	0.058	0.056	---	(3.4)

[1]Purchased electricity only

[2]Average of monthly unit costs, not weighted average cost per Kwh

The universities' electrical unit costs also increased in FY 2001, while the special school's electrical costs decreased slightly. Iowa State University's electrical unit cost increases can be attributed to the limited availability of electricity earlier in the year resulting from the temporary shut-down of two of the University's power suppliers.

The overall increase in electrical costs among the universities is the result of the increasing demand for a decreasing electrical supply and restrictions resulting from limited transmission line capacity. Both have resulted from the deregulated electrical markets across the country.

Coal Costs

Coal Costs ($/Million BTUs)

	FY 1999	FY 2000	FY 2001	% Change FY 1999 – FY 2001	% Change FY 2000 – FY 2001
SUI	1.59	1.60	1.55	(2.5)	(3.1)
ISU	1.63	1.66	1.86	14.1	12.0
UNI	1.62	1.54	1.69	9.7	4.3

The difference in coal costs among the three universities is a function of the differences in coal sizing and content as specified by each university for use in its boilers. In addition, transportation costs, which are also reflected in the coal prices, differ among the universities due to their varying distances from the Mississippi River where the coal is shipped to the state via barge.

Appendix B

Highlights—Energy Conservation Activities

University of Iowa

Annual savings are estimated at approximately $5.4 million from 487 projects identified in the 1989 studies and implemented to date. In FY 2001, the University completed two additional projects which installed energy efficient lighting in the Lindquist Center and temperature controls for the Museum of Art. The projects are estimated to provide additional savings of approximately $17,000 per year (2001 dollars).

The University is continuing its energy conservation improvements at UIHC with the installation of more energy efficient lighting systems and the implementation of off-hour lighting conservation measures. The renovation portion of the Biological Sciences Renovation/Replacement project, which is currently underway, will also incorporate energy conservation measures.

In addition to the energy conservation measures identified in the 1989 audit, the University undertook other projects with energy conservation components during FY 2001. Included were construction of the Seaman's Center for Engineering Arts and Sciences, which is nearing completion, and development of the Hospital Dentistry Institute in the Pomerantz Pavilion, which was completed last spring; both projects incorporated energy-efficient features throughout the building systems. In addition, the University completed the third phase of heating, ventilating and air conditioning improvements for Phillips Hall to utilize campus chilled water for the building; and undertook a number of roof and window replacement projects.

Since the spring of 2000, the University has been participating in the new Energy Efficient Commercial New Construction program sponsored by MidAmerican Energy. The utility provides an independent building energy performance consultant who recommends energy conservation strategies for various building systems in new construction and major remodeling projects. The program also provides construction incentives to the University, in varying amounts, depending on the size of the project.

The University continues to identify and evaluate opportunities to incorporate energy efficient components in new construction and remodeling projects.

Iowa State University

Annual savings are estimated at $213,181 from 108 projects identified in the 1989 studies and implemented to date; these projects have been complete for a number of years. For the general university, the energy conservation measures identified in the comprehensive engineering analyses with payback periods of less than six years have been completed, incorporated into renovations, or determined not to be feasible.

The University completed during FY 2001 energy conservation improvements in the campus steam distribution system and at the power plant which were not identified in the 1989 analyses. Included were asbestos removal and repairs to the steam distribution system, and the insulation of additional piping insulation and replacement of an inefficient water pump.

The University reports that it will continue to review opportunities for energy conservation improvements in its general university facilities and in new building and renovation designs. The University plans to install fume hoods that use 40 percent less energy, and occupancy sensors and high efficiency lighting.

For the Department of Residence, energy conservation measures continue to be prioritized and implemented on the basis of available funding, and are reviewed for incorporation into renovation projects.

The renovation of the heating, ventilating, and air conditioning system at the College of Veterinary Medicine was completed in 1996; the debt service on the master lease financing for the project was retired in FY 2001. Future savings will be applied toward additional energy conservation measures at the College of Veterinary Medicine; this will include the installation of more energy efficient chilled water coils in FY 2002.

University of Northern Iowa

Annual savings are estimated at $373,073 from 74 projects identified in the 1989 studies and implemented to date; the majority of these projects have been complete for a number of years.

The University has targeted additional energy conservation measures with an estimated cost of $606,594 for residence system buildings; the estimated payback period is 4.0 years. This sum includes the incorporation of energy conservation improvements for the Towers Dining Center Improvements project, which would modify or replace the building's heating, ventilating and air conditioning systems as necessary.

The University has completed the Redeker Dining Center project which incorporated improvements to the lighting and heating, ventilating and air conditioning systems into the building renovation.

Iowa School for the Deaf

Annual savings are estimated at $11,410 from 11 projects identified in the 1989 studies and implemented to date; these projects have been complete for a number of years and represent all of the energy conservation measures identified for implementation.

The School continues to pursue additional means to reduce purchased utilities without restricting academic programming. Projects completed during FY 2001 include the installation of new steam mains and returns with thermal pipe insulation; caulking and sealing; exterior door and window replacements; and improved operating and maintenance procedures.

Iowa Braille and Sight Saving School

Annual savings are estimated at $17,479 from 12 projects identified in the 1989 studies and implemented to date; these projects have been complete for a number of years and represent all of the energy conservation measures identified for implementation. The School has completed all practical energy conservation measures with a payback period of six years or less.

The School has undertaken additional energy conservation measures which include the installation of insulation for portions of the tunnel system, replacement of the roof and tuckpointing of the Main Building, and has under construction a project to install a geothermal heat pump system to provide heating and central cooling for Rice Hall.